

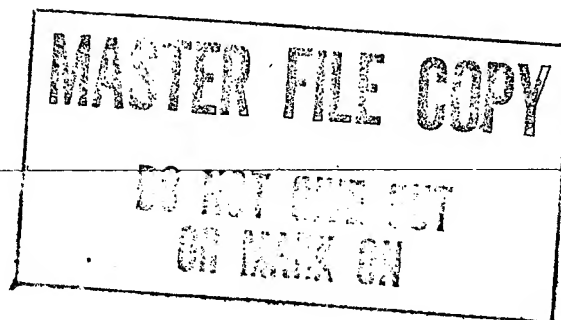


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# Iran: Future Role in the World Oil Market



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An Intelligence Assessment

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# Iran: Future Role in the World Oil Market

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An Intelligence Assessment

This paper was prepared by [ ] Office of  
Global Issues, with contributions from the Persian  
Gulf Division, Office of Near Eastern-South Asian  
Analysis, and the Economics Resource Division,  
Office of Imagery Analysis. It was coordinated  
with the Directorate of Operations [ ]

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Comments and queries are welcome and may be  
directed to the Chief, Energy Issues Branch, Strategic  
Resources Division, OGI, [ ]

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**Iran:  
Future Role in the  
World Oil Market**

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**Key Judgments**

*Information available  
as of 1 August 1983  
was used in this report.*

Iran's desire to revitalize its economy and expand its influence in the Middle East has led Tehran to assign a high priority to restoration and expansion of its oil sector whether or not the war with Iraq ends. At present, Tehran's ability to raise production capacity substantially beyond 3 million barrels per day (b/d) is limited by a shortage of operating rigs and trained personnel. We believe Tehran will partially overcome these problems and succeed in raising capacity to at least 3.5-4 million b/d within the next two years. Although Iran's leaders may desire even higher output over the longer term, sustaining production much above the 4-million-b/d level would be constrained in our view by the massive investment costs, the need for extensive foreign assistance, and the declining deliverability of Iranian oil reservoirs.

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An attempt by Iran to raise production by 1-2 million b/d in the next year or so would have a destabilizing effect on OPEC and on oil prices.

the oil market will remain very weak with demand for OPEC oil rising slowly to perhaps 22 million b/d by 1985. When the war ends, market problems will further intensify as Iraq also attempts to expand exports. Despite Tehran's current adherence to OPEC pricing guidelines, we believe Iran would again discount prices substantially below the OPEC benchmark to prevent its market share from eroding, especially if Iraqi exports were increasing.

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Iran and other OPEC members realize the dangers of a potential collapse in oil prices and may reach an accommodation to prevent a downward price spiral. Much of the burden in adjusting OPEC production would have to fall on Saudi Arabia. Given the political animosities between Iran and other Gulf producers, however, a long-term production sharing agreement is by no means assured, and, if no agreement is reached, oil prices will fall.

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Figure 1  
Iran: Major Producing Oilfields, January 1983



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## Iran: Future Role in the World Oil Market

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### Introduction

Iran was OPEC's second-largest oil producer before the 1979 revolution, producing more than 5 million b/d in 1978. Under the Shah, Tehran had embarked on an ambitious oil development and maintenance program designed to expand productive capacity to 7 million b/d or more by the early 1980s. The program was shelved in the wake of the Shah's fall. The loss of key oil personnel and maintenance capabilities after the revolution, together with some small damage to production and export facilities during the Iran-Iraq war, has caused field capacity to decline.

production capacity has fallen to about 3 million b/d. Recent indications suggest, however, that Iran is taking steps to revitalize its oil industry. The degree to which Iran is able to restore production and the timing of such a restoration will have a major impact on OPEC and the world oil market.

### Effects of the Revolution and War

Oil production fell sharply from 5.2 million b/d in 1978 to less than 3 million b/d following the fundamentalist revolution and below 1.7 million b/d in the early months of the war with Iraq. Although the revolution caused no damage to oil production facilities, the turmoil from worker strikes, loss of foreign personnel and experienced Iranian managers, and a general policy of forgoing oil revenues forced the drop in production. As time passed, numerous shut-in wells began to deteriorate, gradually eroding oil-production capacity. Additional facilities were shut down at the beginning of the war with Iraq to minimize potential damage resulting from Iraqi attacks. Even though the war has gone on for nearly three years, imagery analysis indicates that damage to Iranian oil facilities has been negligible. Nonetheless, we estimate that Iranian production capacity has declined to about 3 million b/d from prerevolution levels of 6 million b/d.

The prolonged shutting in of oilfields and the lack of regularly scheduled maintenance of surface facilities has been the primary cause of the decline in production capacity. More than 50 percent of capacity has been shut in because of clogging of wells and corrosion of surface equipment such as gathering lines and gas-oil separating plants (GOSPs), extensive repairs will be required before production can be restored. Based on well data in industry journals and information on field production levels

we estimate that some 150 wells within the major fields and another 140 wells in the smaller fields have been shut in since the revolution. These wells will require workover service before they can be brought back on stream.<sup>1</sup> In addition to the shut-in wells, we estimate that the 215 currently producing wells will also require workover servicing periodically. Although pumps, compressors, and pipelines are also in need of repair in most fields,

redundant capacity in the oil transport system makes this less of a constraint to higher production.

### Current Iranian Oil Strategy

Iranian decisions on oil strategy will be influenced by a wide range of political, economic, and military considerations. Among these factors will be:

- The need to finance postwar reconstruction, including renewed industrial development projects.
- The perceived security threat and associated spending requirements for rebuilding the military and making strategic facilities (especially within the oil sector) less vulnerable.

<sup>1</sup> Wells that have been shut in for lengthy periods of time often become clogged and require servicing before reopening. To service such wells chemicals are often injected to clean out the well, and in many instances specialized rigs are used to remove and replace well casing or recomplete bottom openings of the well.

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**Prerevolution Oil Development Plan<sup>a</sup>**

*Because of the production maturity of most of Iran's major oilfields, the former foreign operating company (OSCO) planned to implement secondary recovery programs and new development to maintain the 1978 capacity of about 6 million b/d. Remaining fields, including all those offshore, were to be further developed and were expected to contribute another 1 million b/d of capacity for a few years before declining sharply.*

*Onshore. Most of Iran's major fields had experienced rapid declines in natural reservoir pressure, resulting from high rates of production from the late 1960s through 1978. To slow the decline in reservoir pressures, OSCO had devised a massive scheme for collecting gas and injecting it into all of Iran's largest oilfields. Under OSCO's 1979-83 plan, gas injection would have started at 34 billion cubic meters (bcm) annually and risen to 69 bcm annually by 1983. Marun and Gachsaran would have received more than 70 percent of the planned gas injection, which would have sustained peak production rates for one to three years. Development of several new gasfields and natural gas liquids recovery plants were planned as part of the injection program.*

*The program would have involved long leadtimes and required massive expenditures for advanced technology and high-pressure equipment. A much simpler and less costly water injection system to maintain pressure would have been ineffective in Iranian reservoirs. Unlike most other oilfields in the Middle East, most of Iran's major oil reservoirs contain large fractures through which oil flows from tighter oil-saturated rock formations, and injected water would merely be recycled through the fractures within the reservoir.*

*Fractures in Iranian reservoirs have also created production problems in some fields because of contact with underlying water formations. As these fields are produced, water flows into the reservoir and eventually into the producing wells. Normally, either the well invaded by water is shut in and a replacement well is drilled, or a workover is performed to recomplete the bottom opening of the existing well above the water level. About 50 to 60 new well completions—including replacement wells and workovers—were performed annually before the Iranian revolution. Some 40 drilling rigs were operating in 1978, and OSCO planned to keep 32 rigs working through 1983.*

*OSCO's blueprint also called for the installation of 26 desalting plants by yearend 1979 to remove water from the crude. These expensive plants, with a total fluid capacity of nearly 2.4 million b/d, would have greatly reduced the number of wells that would otherwise be shut in because of excess water production. OSCO also planned a small effort to develop 20 discovered but nonproducing oilfields. Only one would have produced more than 20,000 b/d, and the combined contribution was to have been only 184,000 b/d in 1983. Small reserves elsewhere in the country were to be developed by NIOC to provide oil for local needs.*

*Offshore. foreign companies producing the offshore oilfields did not see much potential for expanding capacity in their concessions. To slow the declines in then-existing capacity, several of these fields were scheduled for secondary recovery programs. Gas lift and water injection at Sassan was planned and partially implemented before the revolution. Sirri was also scheduled for a water injection program.*

- The assessment of the country's oil resource base, including concerns about optimal development, depletion, and recovery rates.
- The condition of the international oil market and the importance attached to the prestige and power associated with being a major player in OPEC.

- The desire to wield greater influence in the region and the Islamic world.

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Our analysis of Iranian press articles [ ] shows that only recently has Tehran considered reviving, in part, oil production goals planned prior to the revolution. The resurgence in oil exports during 1982 has fueled modest economic growth, replenished financial reserves, and enabled the regime to begin focusing its attention on longer term economic goals. According to Iranian press articles, although differences over economic policy among various clerical factions within the regime still abound, an expansive development agenda formulated by one of the factions is increasingly gaining hold.<sup>2</sup> Further, as the war becomes less of a politically unifying force, we believe the government will need to provide evidence of economic progress to all levels of the Iranian populace. [ ]

We believe that Iran's financial requirements for its new five-year restoration and development plan—estimated by us at \$50-60 billion—will make revitalization of its petroleum sector a priority before the end of the war. Oil production of 3.5-4 million b/d at present prices would bring in sufficient revenues over the period to meet projected spending requirements. As a result, we believe reopening of shut-in wells and repair and maintenance of major production facilities will be the regime's most important economic objective in the next year or so. Over the longer term, Iran must implement secondary recovery programs and develop new fields if it plans to reach and maintain production rates above 4 million b/d. [ ]

Security concerns are also motivating Tehran to plan new oil projects. Foremost among Tehran's fears is the potential closure of its only major oil export terminal at Khark Island. [ ]

[ ] Although most Iraqi airstrikes against Khark have been ineffective, recent press statements by Iraqi officials of intentions to escalate attacks, coupled with Iraq's acquisition of French Super Etendard aircraft, will likely give added impetus to Iranian security plans. [ ]

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**War Damage**

Iran's oil transport and delivery system has suffered only limited direct damage as a result of the war. Imagery analysis indicates that Iraqi airstrikes early in the war damaged the Gurreh pump facility—a strategically located and vulnerable facility which feeds crude from the mainland to the Khark Island export facility. The large capacity of the station, including the capability to gravity feed 2-4 million b/d of crude to Khark, has allowed Iran to continue exports with only temporary interruptions. Imagery analysis [ ] indicate that sporadic airstrikes on Khark Island itself have been ineffective because of Iranian defenses and the poor performance of Iraqi pilots. The attacks have destroyed less than 20 percent of tank storage capacity and closed down one of the two main berthing facilities for only short periods. Because of organizational and manpower problems, we estimate that only 50 percent of the Khark Island terminals' current rated capacity of 10 million b/d is operational, an amount still well in excess of present production capacity. [ ]

Based on imagery analysis, minor damage also occurred to refineries and pipelines. A pump station

along the Esfahan-Tehran pipeline and several refineries were attacked early in the war. With the exception of the Abadan refinery, most of these facilities were repaired quickly. The Abadan refinery has suffered damage mostly to tank farms; the major distillation units apparently remain intact, although strafing damage may have occurred. Because of the refinery's proximity to Iraq and its vulnerability to attack, Iran will probably dismantle and relocate the facility once the war ends. [ ]

While recent Iraqi attacks at the Now Ruz and Ardeshir offshore oilfields caused some damage to platforms, including the leakage of 4,000 to 7,000 b/d of crude, overall Iranian oil production capabilities were little affected. [ ] the attacks caused Tehran to further shut in production in northern offshore fields. Costs of capping and cleanup operations to the fields could be expensive, however, totaling perhaps \$50 million. [ ]

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**Restoration Capabilities**

Tehran has demonstrated the capability to produce about 3 million b/d, and our engineering estimates indicate that they could continue at this level for the next three years without significant change in their present method of operation. To sustain this rate longer or reach even higher production capacity levels, Tehran must overcome the problems that have plagued its industry since the revolution:

- The loss of experienced managers, worker interference with operational decisions, and a lack of coordination among the various agencies that acquire equipment and supplies have all had an adverse impact on operations.

- The collapse of NIOC's drilling program; the expulsion of foreign contractors left only 12 operable rigs.
- The pullout of foreign firms forced the cancellation of a number of oil-related projects, and outstanding debts are keeping several companies from renewing business with Iran. [ ]

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**Table 1**  
**Iranian Oil Facilities: Damage and Assessments**  
**as of July 1983**

| Facility                                  | Date Damaged | Date Repaired | Units Damaged  | Units Repaired                                    | Comments  |
|---|--------------|---------------|--|---|---|
| Abadan oil refinery                       | 30 Sep 80    |               | Asphalt plant, lube-oil plant, product-treating area                             | None  | Crude oil distillation units appear intact, strafing possible               |
|   |              |               | Water purification buildings, two cooling towers, 75 percent of storage capacity | None  | Jul 83 update   |
| Ardesht offshore oilfield                 | 10 May 83    |               | Three production unit platforms damaged, pipeline to flare severed on one        | None  | Jul 83—attacks reportedly continue  |
| Bandar-e Khomeyni Petrochemical plant     | 13 Oct 80    |               | Minor damage   | None  | Plant was still under construction when the war broke out in 1980           |
| Bandar-e Mah Shahr gas plant and storage  | 28 Oct 80    |               | Five crude oil tanks destroyed   | Destroyed tanks removed                           | Gas plant operating   |
| Sirus offshore oilfield                   |              |               | Unknown  | NA  | Reported; no imagery to confirm   |
| Gurreh booster pump station               | 1 Oct 81     | 28 Oct 81     | Main pumphouse damaged by fire   | Some cleanup noted                                | Jul 83 update—operational status cannot be determined from imagery          |
| Khark Island export terminal              | 1 Oct 80     | 10 Jan 82     | Storage tanks, pipelines to the 10-berth T-jetty                                 | Pipelines to T-jetty                              | An emergency pipeline to bypass the damaged area was completed by 10 Jan 82 |
|   | 16 Jul 82    |               | One bunker fuel tank destroyed   | None  | NA  |
|   | 20 Aug 82    |               | Additional storage tanks   | None  | NA  |
|   |              |               | NA   | NA  | 2 Oct 82 update—major pipelines to the T-jetty still unrepaired             |
|   |              |               | NA   | Pipelines to T-jetty repaired                     | 1 Jan 83  |
| Now Ruz offshore oilfield                 |              |               | NA   | NA  | 1 Jul 83 update—terminal operating; storage tanks have not been repaired    |
|   | 2 Mar 83     |               | Two production well platforms on fire, one damaged                               | None  | Attacks reportedly continue   |
|   |              |               | H-pad damaged on processing platform   | None  | NA  |
|   | 14 Mar 83    |               | No additional damage   | None  | Production well platforms still on fire                                     |
| Pump station 2, Marun-to-Esfahan pipeline |              |               | One of three pumping units damaged   | NA  | Damage occurred before 30 Jun 81  |
| Tabriz refinery                           | 15 Oct 80    |               | One LPG storage tank and adjacent pipeline, cooling tower punctured              | Plant operating                                   | Additional damage: admin building, storage tank, and steam plant destroyed  |
|   | 8 Nov 80     |               | Hydrocracker and adjacent pipelines; minor damage to power plant                 | None  | NA  |
|   | 23 Nov 80    |               | NA   | Power plant operating                             | Refinery still not operating  |
|   | 10 Dec 80    |               | NA   | Hydrocracker and hydrogen plant back in operation | Refinery back in operation  |
|   | 7 Jul 81     | 18 Jul 81     | Damage to water treatment plant  | Repaired and back in operation                    | Refinery operating on 18 Jul 81   |

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**Table 2**  
**Prerevolution Personnel Strength of OSCO and NIOC <sup>a</sup>**

*Number of persons*

|   | Employees on Annual Salary |            | Employees on Daily Pay | Total         |
|---|----------------------------|------------|------------------------|---------------|
|   | Iranian                    | Foreign    |                        |               |
| <b>Total</b>                                  | <b>4,427</b>               | <b>653</b> | <b>8,214</b>           | <b>13,294</b> |
| <b>Management and administration</b>          | <b>2,382</b>               | <b>145</b> | <b>3,790</b>           | <b>6,317</b>  |
| Technical affairs                             | 405                        | 134        | 163                    | 702           |
| Exploration                                   | 69                         | 43         | 53                     | 165           |
| Petroleum engineering                         | 180                        | 56         | 105                    | 341           |
| Planning, information service, and management | 156                        | 35         | 5                      | 196           |
| Operations                                    | 1,244                      | 245        | 3,124                  | 4,613         |
| Field   | 431                        | 22         | 835                    | 1,288         |
| Drilling                                      | 58                         | 108        | 4                      | 170           |
| Services and maintenance                      | 643                        | 52         | 2,178                  | 2,873         |
| Other   | 112                        | 63         | 107                    | 282           |
| Engineering and construction                  | 396                        | 129        | 1,137                  | 1,662         |

<sup>a</sup> Excludes offshore oilfields.

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[ ] KALA has handled on the average at least \$100 million per month of oil-related equipment orders during the past year. This includes \$40 million worth of drilling equipment each month. KALA has also been trying to locate and acquire drilling rigs, for both onshore and offshore. [ ]

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NIOC has recently begun reorganizing its managerial structure and upgrading personnel policies. Attempts are being made to attract senior oil personnel back into the country, and several companies for drilling, offshore operations, and foreign equipment acquisition have recently been created. Iran reportedly has also given high priority to the acquisition of spare parts for rigs to perform well workovers. [ ]

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[ ] In addition, the Iranian Drilling Company reportedly has drawn up a work plan with a specific focus on overcoming the managerial and labor problems, [ ]

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Meanwhile, to facilitate acquisition of equipment, Tehran has established purchasing companies in London (KALA) and more recently in Dubai [ ]

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<sup>3</sup> For further discussion of potential production outlook, see the appendix [ ]

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### **Outlook for Foreign Assistance**

*To reduce the problems of implementing such a complex development program, we believe Iran will increasingly turn to Western oil equipment manufacturers and engineering companies to help carry out production capacity restoration and expansion.*

*If recent trade journal reports are accurate, the Iranian Government is also making a major effort to settle privately the outstanding claims of the major international oil corporations it hopes to do business with in the near future, another sign of major investment plans. Recently Tehran concluded settlements with Shell and Compagnie Francaise des Petroles (CFP) for \$42 million and \$333 million, respectively.*

### **Political Considerations**

The cost of reconstruction and development will be the primary factor influencing Iran's efforts to restore capacity to at least 4 million b/d during the next two years. Iran's ambition to spread its religious and political influence and its longstanding regional rivalries with Arab Persian Gulf states probably will reinforce these financial motivations to raise output.

Domestic political constraints and conservationist attitudes, however, make it unlikely that Tehran will attempt to rebuild capacity substantially above 4 million b/d and could even hinder its achievement of this level of output. The economic activists, the Followers of Iman's Line, have the support of Khomeini in proceeding with the current development plan, including an expansion of oil production capacity, but statements by opposition members indicate the support is delicate. We believe any attempt to expand capacity substantially beyond 4 million b/d would

face opposition from the more fundamentalist clerical factions because substantial foreign participation would be required to implement such a program. Indeed, the threat of retribution from conservatives in a post-Khomeini environment has for the moment intimidated a number of economic activists, including the Speaker of Parliament Rafsanjani, from pursuing an even more ambitious program. In the event that Khomeini's rule ends during the next few years, the development program is likely to flounder until a new clerical leadership emerges and sets a clear course.

### **Oil Market Implications**

Even if the Iran-Iraq war does not end, we believe Iranian attempts to expand exports by 1-2 million b/d will pose a great threat to OPEC's ability to maintain prices over the next two to three years. While Iran has so far abided by the OPEC production accord of March 1983, its stated desire to return to higher production levels and its flagrant disregard for quotas last year suggest that Tehran may not hold the line for long. Because most market forecasters expect demand for OPEC oil to rise slowly to perhaps 22 million b/d through 1985, we believe the market probably will be unable to absorb any significant quantities of additional Iranian oil without offsetting cuts by other producers or a sizable reduction in oil prices. While a sizable drop in the world oil price could have a positive impact on the economies of oil-importing countries, it would also create severe financial problems for a number of oil producers—both OPEC and non-OPEC.

When the Iran-Iraq war ends, the addition of Iraqi crude will exert further downward price pressures on the market. Iran and other OPEC members are clearly aware of the dangers of a price collapse and may reach the necessary accommodation to prevent a downward price spiral. Avoiding a fall in prices, however, will depend largely on Saudi willingness to provide aid to Iraq and reparations to Iran as an inducement to limit postwar increases in oil exports.

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Alternatively, the Saudis could reduce their oil output to make room for increased Iranian and Iraqi oil sales. In both cases the effort to keep the market stable would be expensive for the Saudis, given the potential size of Iranian and Iraqi exports.

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Preventing a price collapse will be further complicated by the political animosity between Iran and its Persian Gulf neighbors. Tehran probably will opt to reach a higher level of capacity as a means to influence OPEC decisions as well as to obtain economic leverage to promote its regional political objectives. At the minimum, we doubt that Iran would sit by idly while Iraqi exports and revenues increased substantially. Tehran would likely use its added production capability to drive a hard bargain in OPEC circles and to compete vigorously in the market to force Iraq to limit its exports. At the same time, Tehran must take into consideration that it would also be a likely loser in an oil production and pricing war with its neighbors because of the substantial surplus capacity and large financial reserves that exist in Saudi Arabia and other Gulf Corporation Council states. Given the animosity between Iran and its Persian Gulf neighbors, however, a long-term agreement on oil production quotas is by no means assured.

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## Appendix

### Production Capabilities Through 1990

Iranian reservoirs are capable of supporting production well above the current rate of 2.5 million b/d. To achieve these higher rates in the near term, Iran must reopen shut-in fields and repair surface facilities. Iran could also reduce separator pressures at its major gas-oil separation plants, causing an increase in output as the higher pressured reservoirs forced more oil up to the lower pressured surface units. Over the medium term, however, Iran must drill new wells, implement secondary recovery programs, and install desalters (water removers) to maintain higher rates of production. Without implementation of these measures, deliverability of Iranian reservoirs would fall below 3 million b/d by the late 1980s.<sup>5</sup>

We have analyzed three distinct production scenarios for the performance of Iranian reservoirs through 1990 using data based on alternative levels of production and investment. Because operational facility capacity is currently well below that of reservoir capacity, we have gradually phased in the reopening of shut-in fields through 1985, on the basis of our assumptions as to the number of wells Iran could drill.<sup>6</sup>

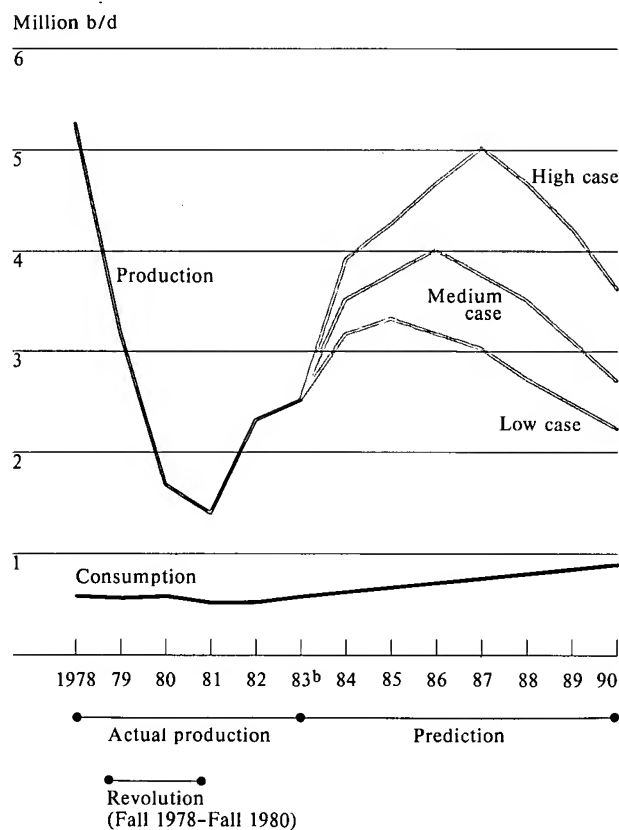
#### Low Production

Our analysis shows that, if no further drilling or secondary recovery operations take place and if surface facilities are returned to prerevolution conditions,

<sup>5</sup> Production deliverability of a reservoir refers to the production capacity of the reservoir itself. Available operational capacity takes into consideration the number of open wells and the capacity of surface processing facilities such as gas-oil separation plants and distribution lines to produce and deliver oil. Because of well closures or defective surface facilities, operational capacity will invariably be considerably less than the production deliverability of the reservoirs.

<sup>6</sup> To analyze the longer term performance of the Iranian reservoirs, we have used a material balance model that measures the effects of reservoir pressures and movements of the gas-oil and water-oil contacts on production in the six largest Iranian oilfields—Ahvaz, Marun, Gachsaran, Agha Jari, Bibi Hakimeh, and Abu ol Fares. The model reduces or eliminates well flows as reservoir pressures drop or as wells are invaded by water or gas. Production from Iran's remaining oilfields is assumed to follow normal decline curves based on comparisons with historical production data for similar fields.

**Figure 5**  
**Iran: Production Capacity Scenarios<sup>a</sup>**



<sup>a</sup> Excludes natural gas liquids.

<sup>b</sup> Preliminary.

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**Table 3**  
**Iranian Oilfields**

|                      | Sep 1978<br>Capacity | Nov 1979 <sup>a</sup><br>Production | Mar 1983<br>Production | Remaining Reserves<br>Jul 1980<br>(million barrels) |
|----------------------|----------------------|-------------------------------------|------------------------|---|
|                      | <i>Thousand b/d</i>  |                                     |                        |   |
| <b>Total</b>         | <b>6,641</b>         | <b>3,567</b>                        | <b>2,650</b>           | <b>58,000</b>                                       |
| <b>Onshore</b>       | <b>5,921</b>         | <b>3,102</b>                        | <b>2,371</b>           | <b>56,000</b>                                       |
| Marun                | 1,380                | 684                                 | 667                    | 10,230  |
| Ahvaz                | 1,370                | 871                                 | 516                    | 8,430   |
| Gachsaran            | 1,000                | 616                                 | 478                    | 10,790  |
| Agha Jari            | 630                  | 357                                 | 302                    | 7,060   |
| Bibi Hakimeh         | 327                  | 96                                  | 157                    | 2,360   |
| Abu ol Fares         | 250                  | 0                                   | 44                     | 1,430   |
| Other                | 964                  | 478                                 | 207                    | 15,700  |
| Karanj               | 265                  | 0                                   | 0                      | NA  |
| Rag-e Safid          | 238                  | 133                                 | 107                    | NA  |
| Pazanan              | 105                  | 133                                 | 69                     | NA  |
| Kupal                | 70                   | 0                                   | 0                      | NA  |
| Binak                | 60                   | 21                                  | 0                      | NA  |
| Khark <sup>b</sup>   | 50                   | 40                                  | 0                      | NA  |
| Naft Safid           | 33                   | 29                                  | 0                      | NA  |
| Lab-e Safid          | 27                   | 23                                  | 0                      | NA  |
| Mansureh             | 23                   | 17                                  | 31                     | NA  |
| Dehloran             | 23                   | 22                                  | 0                      | NA  |
| Chashmeh Khush       | 20                   | 34                                  | 0                      | NA  |
| Naft-e Shah          | 20                   | 12                                  | 0                      | NA  |
| Chilingar            | 10                   | 0                                   | 0                      | NA  |
| Masjed-e Suleyman    | 10                   | 8                                   | 0                      | NA  |
| Par-e Siah           | 4                    | 2                                   | 0                      | NA  |
| Haft Gel             | 3                    | 4                                   | 0                      | NA  |
| Ramin                | 3                    | 0                                   | 0                      | NA  |
| <b>Offshore</b>      | <b>720</b>           | <b>465</b>                          | <b>275</b>             | <b>2,000</b>  |
| Sassan               | 200                  | 142                                 | 165                    | NA  |
| Ardeshir             | 150                  |                                     | 0                      | NA  |
| Fereidoon            | 140                  | 211                                 | 65                     | NA  |
| Daryush              | 70                   |                                     | 0                      | NA  |
| Sirus                | 30                   |                                     | 0                      | NA  |
| Sirri                | 35                   | 38                                  | 20                     | NA  |
| Rakhsh               | 30                   | 36                                  | 0                      | NA  |
| Rostam               | 20                   |                                     | 25                     | NA  |
| Now Ruz <sup>c</sup> | 20                   |                                     | 0                      | NA  |
| Bahrgan Sar          | 15                   | 38                                  | 0                      | NA  |
| Hendijan             | 10                   |                                     | 0                      | NA  |

<sup>a</sup> Estimated from associated gas production data for onshore fields.<sup>b</sup> Partially offshore.<sup>c</sup> Current leakage, 4,000 to 7,000 b/d.

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Iran could produce 3-3.5 million b/d for no more than four years before production drops off because of pressure declines. A failure to reopen shut-in fields or to repair deteriorated equipment would keep production capacity at lower levels. [REDACTED]

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**Medium Production**

By resetting separator pressures on major GOSPs to lower levels, Iran could immediately raise its production capacity by about 0.5 million b/d, to 3.5-4.0 million b/d. Our analysis indicates that this level of production could be sustained for three years if Tehran starts a modest gas injection program by 1985 in the Marun and Gachsaran fields and drills 25 new production wells in existing fields. Only with greater levels of gas injection and additional well drilling could production at this level be extended until 1990.

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**High Production**

An attempt by Iran to produce at levels substantially above 4 million b/d would require a major financial effort—one which we believe is far beyond Iran's capability—and extensive foreign participation. With a greatly accelerated workover schedule to bring currently shut-in fields on stream and implementation of a full-scale gas injection plan at Marun and Gachsaran, Tehran could reach a production capacity of 5 million b/d by 1987. Based on existing proved reserves, however, such a rate would be unsustainable and production would decline sharply in the 1990s.

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